

The first report on the spider fauna (Arachnida: Araneae) of the Lut Desert, Iran

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Abstract — The first inventory of the spider fauna of the Lut Desert, known as one of the hottest deserts in the world, is provided. Spiders collected during the Iranian Biological Expedition in November 2016 are reported. We identified 15 species belonging to 12 families, including the new species, *Oecobius fahimii* sp. n. (female, Oecobiidae), which is described and illustrated here. In addition, three species – *Devade tenella* (Tyshchenko 1965) (Dictynidae), *Gnaphosa ukrainica* Ovtsharenko, Platnick et Song 1992 and *Haplodrassus caspius* Ponomarev et Belosludtsev 2008 (both Gnaphosidae) – are reported from Iran for the first time.

Key words — new records, new species, southeastern Iran, xeric habitats

Introduction

Spiders of Iran have been subject to intense study in recent years. The number of species known from this country has increased from 141 in 2001 to nearly 700 in 2018 (Zamani et al. 2018). Although the number of species from Iran has increased significantly, the territory remains unevenly studied, with remote mountainous and large desert areas remaining unexplored. Recently, the first author had an opportunity to join an international expedition to the Lut Desert during 10–19 November 2016 to investigate the spider fauna.

The Lut Desert (Dasht-e Lut) is a large semi-enclosed basin, with an area of about 80,000 km², located in Kerman and Sistan & Baluchistan provinces of Iran (Ehsani & Quiel 2008) (–Fig. 1). The sand surface of this desert can reach temperatures as high as 78.2°C, as was recently measured on the latest expedition (Akhani & Aghakouchak, pers. comm.). It is partially surrounded by mountains, with an internal drainage, characteristic of several localities in Central Asia. The Lut Desert, however, comprises several unique geomorphological units, including volcanic plain (Gandom Berian), several playas of various sizes (e.g. Shoor Gaz-e Hamoon, Chaleh Malekmohammad), a highly saline river (Kal-e Shoor), flat gravelly plains, huge sand dunes in Rig-e Yalan, yardangs and geological formations formed by wind erosion and divided by large, wind-swept corridors (Walker 1986; Sepehr & Almodaresi 2013; Kamali & Anderson 2015).

Much of the Lut Desert is without vegetation. Therefore,

primary producers (vascular plants) are absent from most parts of the studied area. Identifying faunal biodiversity is a crucial step towards understanding food chain relationships, ecosystem functions and adaptive traits in this extremely harsh environment.

This paper presents the results of the first investigation of the araneofauna of the Lut Desert from the latest Iranian Biological Expedition. Data from specimens previously collected in the Lut Desert and surrounding areas are also included.

Materials and methods

All the materials were collected by the first author during November 2016 unless stated otherwise. Specimens were photographed at the Zoological Museum (University of Turku, Finland) with a Canon EOS 7D camera attached to an Olympus SZX16 stereomicroscope and a SEM JEOL JSM-5200 scanning electron microscope. Digital photographs of male palps and intact epigynes were taken in dishes with paraffin at the bottom. Digital images were prepared using ‘CombineZP’ and Zerene Stacker image stacking software. All measurements are given in millimeters (mm). Lengths of leg segments were measured on the dorsal side. Leg measurements are given in the following sequence: total (femur, patella, tibia, metatarsus, tarsus). The depositories of the studied material are the Jalal Afshar Zoological Museum of the University of Tehran (JAZM), the Manchester Museum, University of Manchester, United Kingdom (MMUE) and the Zoological Museum of Perm State University (PSU).



Fig. 1. Collection localities of the material treated in this paper: 1, Kal-e Shoor Lake; 2, Rig-e Soukhteh Lake; 3, 4 km NE of Shahdad; 4, Shoor Gaz-e Hamoon Lake; 5, 29°55'44''N, 59°01'30''E; 6, Shahrokh Abad.

Collecting localities are as follows (Fig. 1):

- 1) Kerman Province: surroundings of Kal-e Shoor Lake, 31°00'08''N, 57°40'44''E, 290 m, 12.11.2016 (Fig. 6E).
- 2) Kerman Province: Rig-e Soukhteh Lake, 30°58'58''N, 57°43'03''E, 270 m, 14.11.2016 (Fig. 6F).
- 3) Kerman Province: 4 km NE of Shahdad, 30°28'55''N, 57°44'53''E, 340 m, 11.11.2016 (Fig. 6D).
- 4) Kerman Province: surroundings of Shoor Gaz-e Hamoon Lake, 30°24'13''N, 58°33'13''E, 270 m, 15.11.2016 (Fig. 6B).
- 5) Kerman Province: 29°55'44''N, 59°01'30''E, 260 m, 18.11.2016.
- 6) Sistan & Baluchistan Province: Shahrokh Abad, 29°10'26''N, 59°32'57''E, 18.11.2016.

Results

Agelenidae C.L. Koch 1837

Benoitia lepida (O. Pickard-Cambridge 1876)

B. l.: Zamani et al. 2016: 103, figs 4–6 (♂♀).

Material: 1♀1♂ (JAZM) #3.

Comments: This species is currently known from Spain, North Africa, Cyprus, Israel, Iran and Yemen (World Spider Catalog 2018). In Iran, it has been recorded from Fars and Razavi Khorasan provinces (Brignoli 1977; Zamani et al. 2016). Our record from the Lut Desert is the easternmost locality of the species' range. This species was common in typical agelenid sheet-webs placed amongst the vegetation.

Dictynidae O. Pickard-Cambridge 1871

Devade tenella (Tyshchenko 1965)

D. uiensis: Esysunin & Efimik 2000: 684, figs 1.1–2, 2.7, 3.3–4 (♂♀).

Material: 1♂1♀ (PSU), #2.

Comments: This is the second *Devade* species that has been recorded from Iran, after the recently described *Devade naderii* Zamani et Marusik 2017 from Bushehr Province (Zamani & Marusik 2017). In the Lut Desert, this nocturnal species inhabits the salty shores of saline lakes, making typical dictynid-type webs at the entrances of holes and other available spaces in the substrate. The species has a Central Asian steppe-desert range, being distributed from Ukraine to Western China (Esysunin & Marusik 2001); our record is the southernmost of the species' range.

Eresidae C. L. Koch 1845

Stegodyphus lineatus (Latreille 1817)

Fig. 5A

S. l.: Kraus & Kraus 1989: 231, figs 1–2, 28, 202–205, 227–228, 234–242 (♂♀).

Material: 1♀ (JAZM), #3.

Comments: This species is distributed from the West Mediterranean to Tajikistan, previously recorded from Bushehr, Hormozgan and Kerman provinces of Iran (Zamani et al. 2018). It is a common desert species that was abundant in several localities, seen in their webs (sometimes in communal webs) built among the leaves and twigs of *Tamarix* spp. and *Salsola* spp.

Cheiracanthiidae Wagner 1887

Cheiracanthium cf. *montanum* L. Koch 1877

C. m.: Sterghiu 1985: 116, figs 35a–d (♂♀).

Material: 1♀ (JAZM), #5.

Comments: This species is distributed throughout the Palaearctic, previously recorded from Golestan and Razavi Khorasan provinces of Iran (Zamani et al. 2018). The specimen

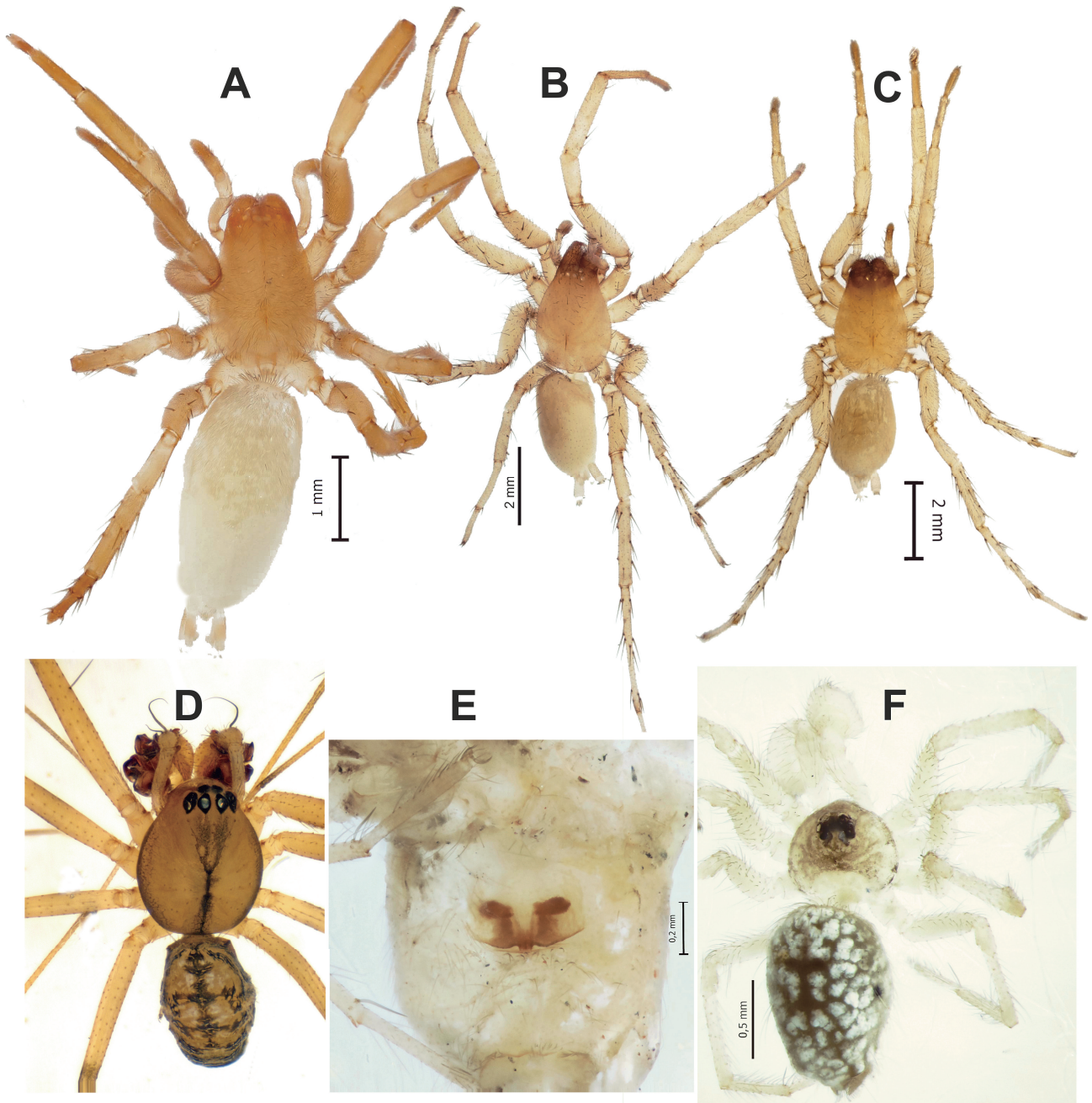


Fig. 2. Habitus of *Haplodrassus caspius* (A), *Gnaphosa ukrainica* (B–C), *Megalepthyphantes camelus* (D) and *Oecobius fahimii* sp. n. (E–F). A, C, female, dorsal; B, D, male, dorsal; E, abdomen of the holotype female, ventral; F, paratype, subadult male, dorsal.

was captured as a subadult in a dry, sandy habitat with sparse vegetation consisting of *Tamarix pycnocarpa*, *Salsola* sp. and *Suaeda* sp. and reared to maturity in captivity. The current identification requires confirmation once a male has been collected.

Gnaphosidae Pocock 1898

***Gnaphosa ukrainica* Ovtsharenko, Platnick et Song 1992**
Figs 2B–C, 3G–H, 4D–F, 5D

G. u. Ovtsharenko et al. 1992: 17, figs 49–50 (♂).

G. turkmenica Ovtsharenko et al. 1992: 18, figs 53–54 (♀).

G. u.: Kovblyuk 2005: 136, figs 8–13 (♂♀).

Material: 1♀ (JAZM) #1, July 2013 (B. Izadi); 1♂ 1♀ (MMUE), #1; 2♂ 1♀ (JAZM), #2.

Comments: This species was previously known from Ukraine to West Siberia (Novosibirsk Region) and south to Turkmenistan (Kovblyuk 2005; Azarkina et al. 2018). It is the first record of this species from Iran, representing the

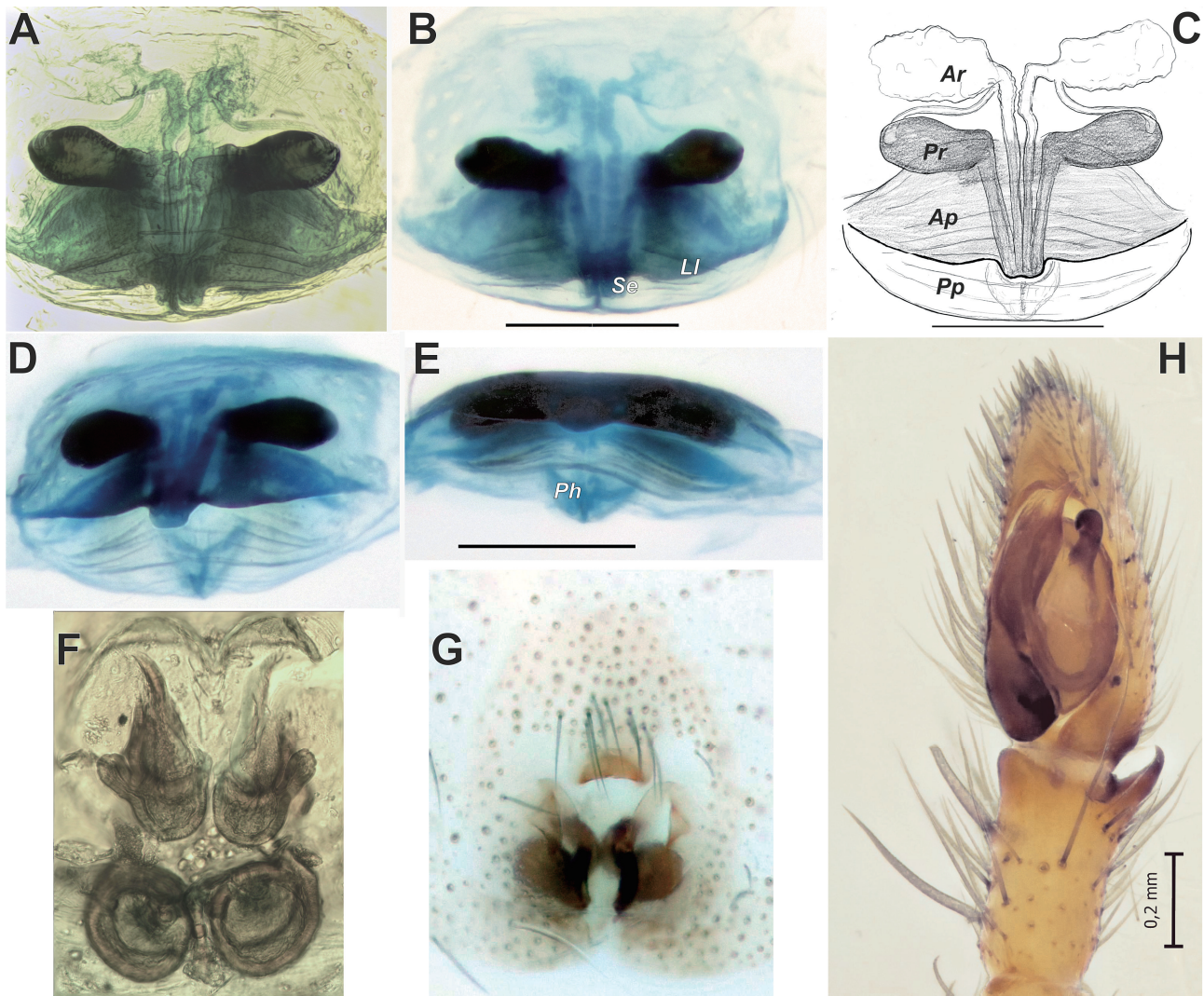


Fig. 3. Copulatory organs of *Oecobius fahimii* sp. n. (A–E), *Haplodrassus caspius* (F) and *Gnaphosa ukrainica* (G–H). A–C, G, epigyne, ventral; D, epigyne, posteroventral; E, epigyne, posterior; F, epigyne, dorsal; H, male palp, ventral. Scale = 0.2 mm, scales for 3F and 3G are not available. Abbreviations: *Ap* anterior plate; *Ar* anterior receptacle; *Ll* lateral lobe; *Ph* hood of posterior plate; *Pp* posterior plate; *Pr* posterior receptacle; *Se* septum.

southernmost limit of its range. This spider seems to be a “halophilous” species, as our specimens were closely associated with hypersaline habitats in the desert, running freely on salty substrates of lake shores; according to Kovblyuk (2005), specimens from Ukraine and Turkmenistan were also collected from salt-marshes. This species seems to be the smallest of the genus, with a light yellow coloration, which is unusual for most *Gnaphosa* species. Here we present figures of the male palp to show the complex embolus.

***Haplodrassus caspius* Ponomarev et Belosludtsev 2008**

Figs 2A, 3F

H. c.: Kovblyuk et al. 2013: 67, figs 1–11 (♂♀).

Material: 1♀ (MMUE), #4.

Comments: This species was previously known from

Russia (Astrakhan Region), Kazakhstan (Atyrau Region) and Azerbaijan (Ponomarev et al. 2008; Kovblyuk et al. 2013), thus it is the first record of the species from Iran, with the Lut Desert being the southernmost locality of its range. The single specimen was collected at night, foraging on the ground along the shore of a saline lake. We have illustrated its epigyne (Fig. 3F) to prove our identification: this species has a characteristic anterior hood and large glands on the copulatory ducts.

***Nomis cf. aussereri* (L. Koch 1872)**

Fig. 5C

N. a.: Levy 1995: 929, figs 21–25 (♂♀).

Material: 1♀ (JAZM), #3.

Comments: This species is distributed in Southern Eu-

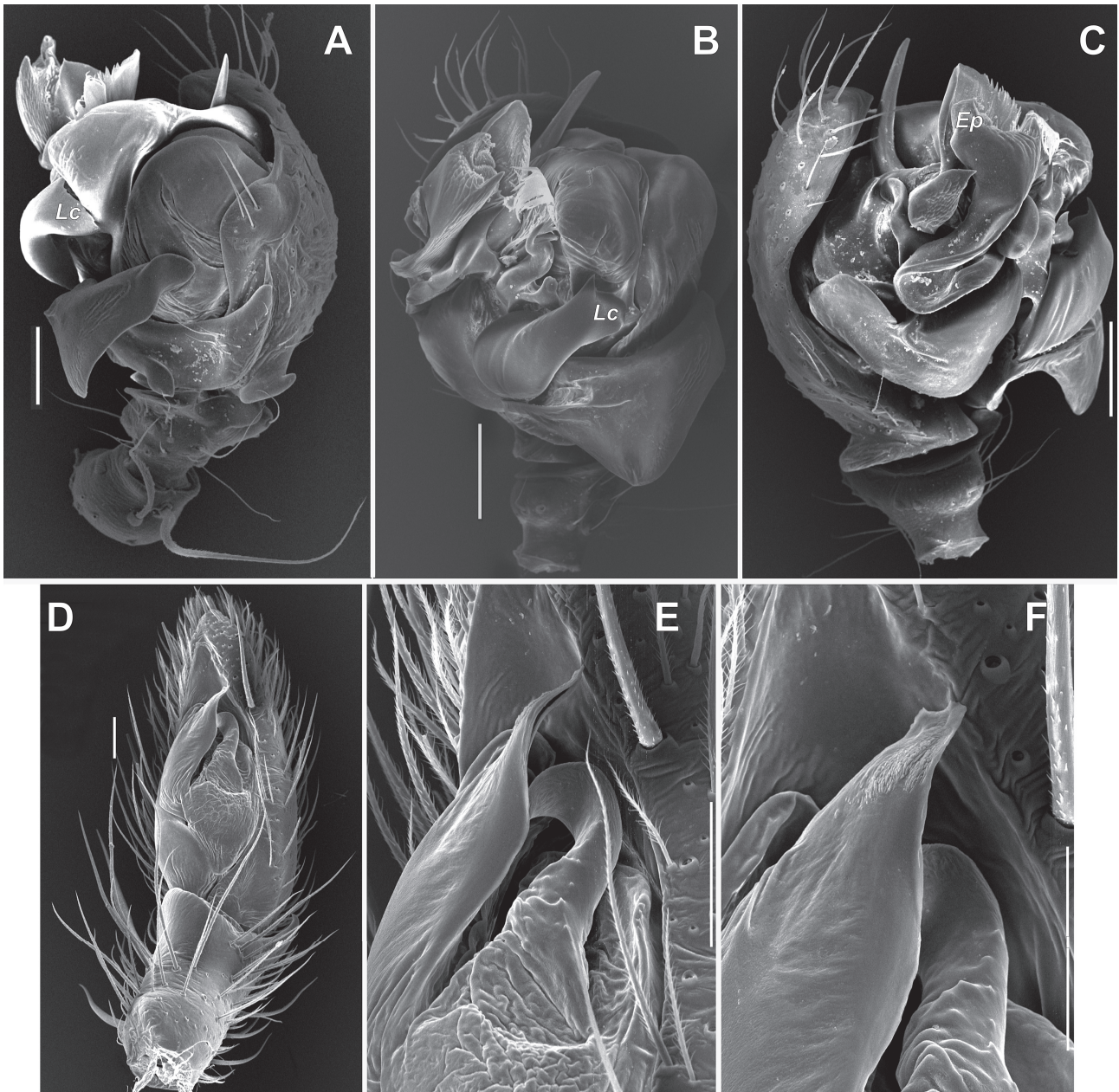


Fig. 4. Male palp of *Megalephyphantes camelus* (A–C) and *Gnaphosa ukrainica* (D–F). A–C, retrolateral, ventral and prolateral; D, ventral; E, terminal part of palp, ventral showing furrow of embolus; F, terminal part of palp, ventro-prolateral. Scale = 0.1 mm. Abbreviations: *Ep* embolus proper; *Lc* lamella characteristica.

rope, North Africa to Near East, Turkey, the Caucasus, Russia to Central Asia and China; in Iran, it has been recorded from Alborz, East Azarbayjan and Mazandaran (Zamani et al. 2018). The single specimen was collected beneath a large stone in a well-vegetated habitat. This specimen has morphological differences that are incongruent with the available illustrations of this species (e.g. lateral margins of epigyne), and thus it might be an undescribed species. This can be confirmed after additional material, including males, has been collected.

Linyphiidae Blackwall 1859

Megalephyphantes camelus (Tanasevitch 1990)

Figs 2D, 4A–C

M. c.: Tanasevitch 2009: 398, figs 38–42 (♂♀).

Material: 1♂ (MMUE), #3.

Comments: This species was recorded from Iran and Azerbaijan; in Iran, it has been recorded from the northern (along the Alborz Mts.) and western to southwestern (along the Zagros Mts.) areas of the country (Zamani et al. 2018).

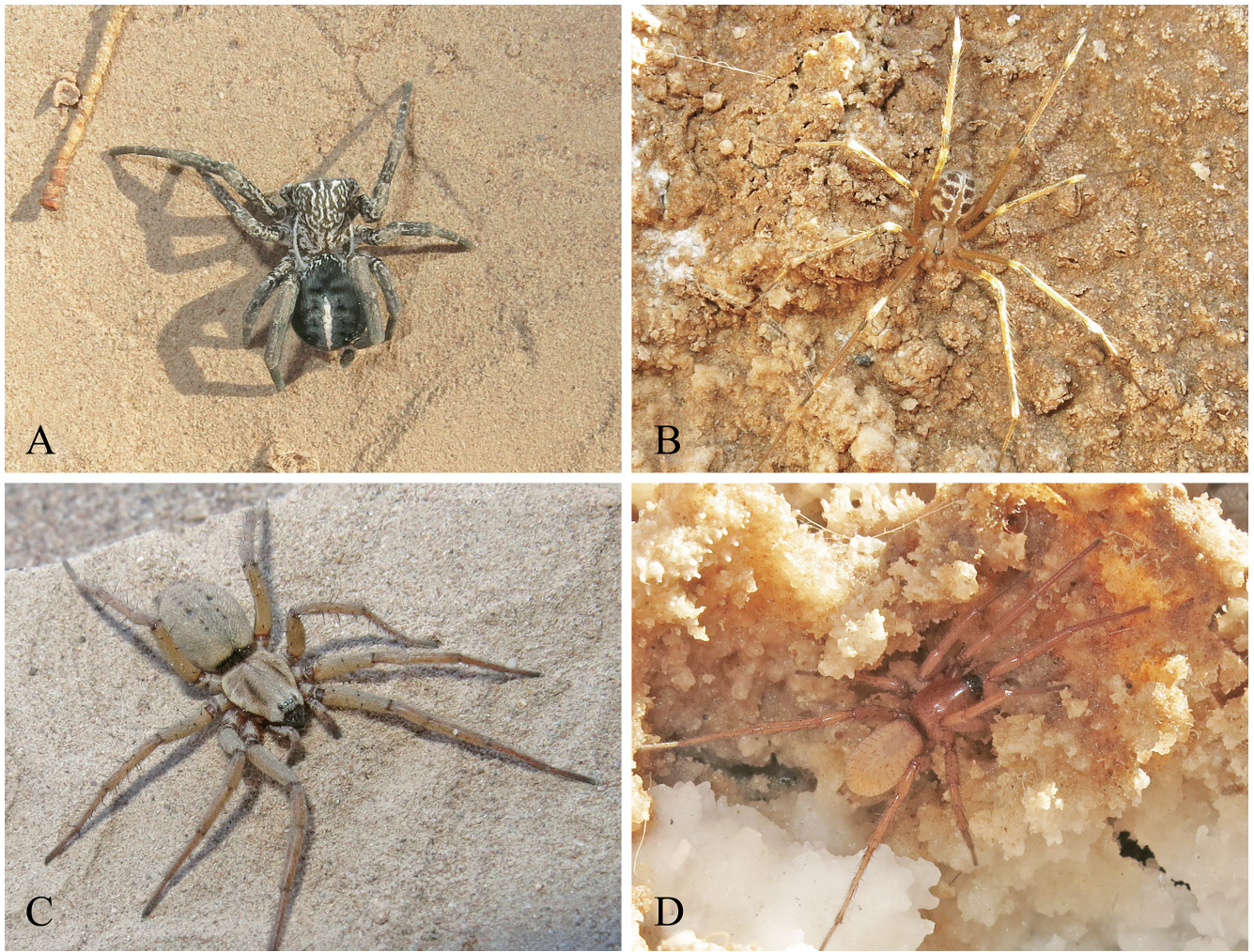


Fig. 5. Habitus of some of the spiders encountered in the Lut Desert: *Stegodyphus lineatus* (A), *Artema doriae* (B), *Nomisia* cf. *aussereri* (C) and *Gnaphosa ukrainica* (D).

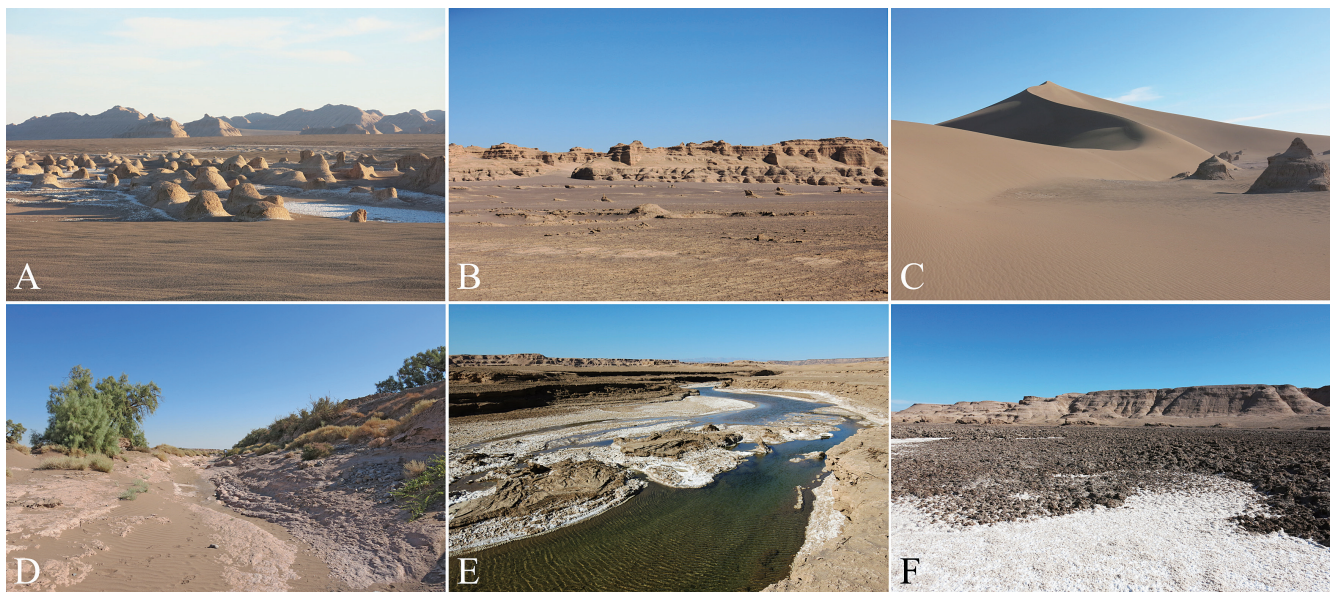


Fig. 6. Some of the habitats encountered in the Lut Desert: northeastern edge of the desert's central valley (A), surroundings of Shoor Gaz-e Hamoon Lake (B, #4), Rig-e Setareh (C), 4 km northeast of Shahdad (D, #3), Kal-e Shoor Lake (E, #1), Rig-e Soukhteh Lake (F, #2).

The current material represents the southeasternmost limit of the species' range. We provide figures of its habitus and details of the male palp indicating differences from its sibling species, *M. kuhitangensis* (Tanasevitch 1989), which is known from adjacent Turkmenistan and Afghanistan (cf. Tanasevitch 2009). The two species can be reliably differentiated by the shape of the embolus proper (*Ep*) and the terminal part of the lamella characteristica (*Lc*).

Lycosidae Sundevall 1833

Arctosa perita (Latreille 1799)

A. p.: Fuhn & Niculescu-Burlacu 1971: 185, figs 91a–d (♂♀).

Material: 1 ♀ (JAZM), #4.

Comments: This species is known from West Europe to the Caucasus and Mazandaran. In Iran, it has been recorded from Mazandaran Province by Ghahari & Tabari (2012). This nocturnal spider is a common species around the Shoor Gaz-e Hamoon salt lake, frequently found on the sandy, salty substrates near the water and in silk-lined burrows in an open habitat sparsely populated with *Tamarix pycnocarpa*.

Oecobiidae Blackwall 1862

Oecobius fahimii sp. n.

Figs 2E–F, 3A–E

Type material: Holotype ♀ and paratype subadult ♂ (MMUE), IRAN: *Kerman Province*: Lut Desert, 4 km NE of Shahdad, 30°28'55"N, 57°44'53"E, 344 m, 11.11.2016 (A. Zamani).

Etymology: This species is named after the late Mr. Hadi Fahimi, an Iranian herpetologist, conservationist, member of the biological expedition to the Lut Desert and friend of the first author, who passed away in the recent Iran Aseman Airlines Flight 3704 accident.

Diagnosis: The new species is most similar to *O. rhodiensis* Kritscher, 1966 (cf. fig. 51 in Wunderlich 1995) from Greece, Turkey and Crete. Both species have well-sclerotized oval receptacles and a well-sclerotized epigynal plate. Other *Oecobius* have weakly sclerotized and transparent receptacles and a weakly sclerotized epigynal plate. The two similar species differ in the profile of the epigynal plate, with the septum (*Se*) extending beyond the lateral lobes (*Ll*) in the new species, compared to the visibly shorter septum in *O. rhodiensis* (not extending beyond the lobes). Additionally, the new species has markedly longer ducts.

Description: The holotype is badly damaged; therefore, a detailed description cannot be provided regarding its coloration, measurements, etc.; its coloration is here described based on the subadult male. Total length 2.5. Carapace whitish, with pale dark grey marks. Sternum, labium, chelicerae and maxillae light brown, without any distinct patterns, with scattered short setae. Abdomen greyish, with numerous white guanine patches dorsally and ventrally. Measurements

for leg IV: 3.47 (0.9, 0.35, 0.8, 0.92, 0.5).

Epigyne as in Figs 3A–E; composed of 2 plates, strongly sclerotized anterior (or ventral) plate (*Ap*) and weakly sclerotized posterior plate (*Pp*) with transverse wrinkles; anterior plate with a kind of septum (*Se*); the two plates form a large pocket (*Ep*); two pairs of ducts originate from the septum, the lateral pair lead to oval, well-sclerotized posterior receptacles (*Pr*), and the longer mesal pair of ducts lead to the transparent, weakly sclerotized anterior receptacles (*Ar*); the anterior and posterior receptacles are connected by narrow ducts (*Cd*); the posterior plate has a kind of hood (*Ph*).

Comments: Terminology of the copulatory organs in Oecobiidae was developed by Baum (1980). Here we used additional terms, such as septum and anterior and posterior epigynal plates. The term “connecting ducts (*Cd*)” refers to Baum’s “Befruchtungsgang-Abschnitte 1” or B1, “lateral ducts” refers to “Einführungsgang-Abschnitte 1 and 2” or EG 1,2, “mesal ducts” refers to “Befruchtungsgang-Abschnitte 2” or B2, “posterior receptacle” refers to “sklerotisierte Kapsel” or K; “hood of posterior plate (*Ph*)” seems to refer to “Befruchtungsgang-Abschnitte 3” that should lead to the uterus, although there are no ducts connected to the hood.

Distribution. The type locality only.

Pholcidae C. L. Koch 1850

Artema doriae (Thorell 1881)

Fig. 5B

A. d.: Aharon et al. 2017: 30, figs 90–120, 205, 212 (♂♀).

Material: 1 ♂ (JAZM), #3.

Comments: This species is distributed from Turkey to Afghanistan, south to UAE and is also introduced in Japan (Aharon et al. 2017). In Iran, it has been recorded from Alborz, Kerman, Kohgiluyeh & Buyer Ahmad, Mazandaran, Semnan and Tehran provinces. This species is common in the Lut Desert and was found in several localities under large stones and in the cracks of clay boulders.

Nita elsaff Huber et El-Hennawy 2007

N. e. Huber & El-Hennawy 2007: 46, figs 1–16 (♂♀).

Material: 1 ♀ (JAZM), #3.

Comments: This species was previously known from Egypt, Uzbekistan, and recently recorded from Mazandaran Province of Iran (Huber & El-Hennawy 2007; Zamani et al. 2018). The single specimen was collected from a loosely-built web under a large stone.

Salticidae Blackwall 1841

Aelurillus unitibialis Azarkina, 2002

A. u. Azarkina 2002: 260, figs 86–95 (♂♀).

Material: 1 ♀ (JAZM), #1.

Comments: This species was previously only known from Fars Province of Iran (Azarkina 2002); thus, our material represents the easternmost collection record of *A. unitibialis*.

This species inhabits lake shores and river banks in arid habitats: the type material was collected around the Maharloo Salt Lake (Azarkina 2002), and the current material was also collected from the shore of a saline lake.

Thomisidae Sundevall 1833

Thomisus zyuzini Marusik et Logunov 1990

T. z.: Demir et al. 2008: 45, figs 2–3 (♂).

Material: 1♂ (JAZM), #3.

Comments: This species is distributed from Turkey to Mongolia and south to Saudi Arabia (Marusik & Logunov 1990). In Iran, it has been recorded from Alborz, Isfahan and Razavi Khorasan provinces (Zamani et al. 2018).

Zodariidae Thorell 1881

Parazodarium raddei (Simon 1889)

P. r.: Ovtchinnikov et al. 2009: 471, figs 1.1–6 (♂♀).

Material: 1♂1♀ (JAZM), #6.

Comments: This species has a Central Asian distribution, occurring from Turkmenistan to Afghanistan (Ovtchinnikov et al. 2009). In Iran, it is known from Qom, Razavi Khorasan, West Azarbayjan and Yazd provinces (Zamani et al. 2018).

Discussion

Our results yield 15 species of spiders belonging to 12 families, one of which is described as new, and three are recorded from Iran for the first time. For three species (*Devade tenella*, *Gnaphosa ukrainica* and *Haplodrassus caspius*) the southernmost, for two (*Aelurillus unitibialis* and *Benoitia lepida*) the easternmost and for one species (*Megalephthantes camelus*) the southeasternmost distribution limits have been recorded. Despite the diversity for this region, we expected some desert specialists (e.g. *Callipelis*, *Cebrennus*) that were not collected. Also, a portion of the material was not identifiable to species due to the immature status of the specimens (e.g. *Lachesana* sp., *Uroctea* sp.), and therefore, not included in the present list. It should be mentioned that a small portion of the collected material (most likely belonging to undescribed species of the genera *Evippa*, *Proszynskiana* and *Pterotricha*) were not included in the present paper and will be dealt with in separate revisionary studies.

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